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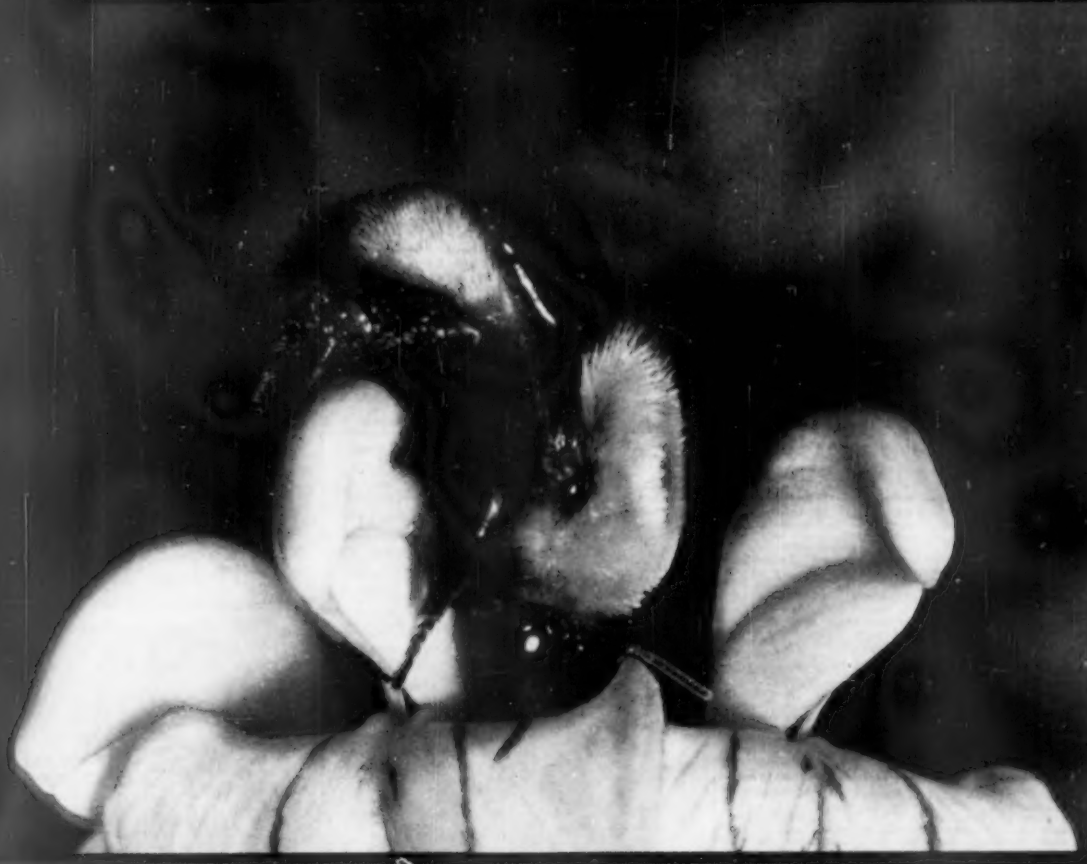
THE WEEKLY SUMMARY OF CURRENT SCIENCE



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PLANT PHYSIOLOGY

Seeds Resist Drought

A Russian botanist reports that he has grown drought-resistant plants from seed subjected to a soaking-drying period. Future generations were also resistant.

SOAK YOUNG wheat seed in water, dry it and the wheat plant that grows will be drought-resistant. Not only will the plant survive a dry spell, successive generations will also be resistant.

Dr. P. A. Henckel, a Russian botanist and a member of the USSR Academy of Sciences, Moscow, told SCIENCE SERVICE that he has increased the drought resistance of several different plants without time-consuming and expensive breeding experiments. All that is required is a single soaking of the seed followed by air drying. No apparatus is needed, D. Henckel said, and the main cost is the labor in handling the seed.

(The results of this work support the controversial theory that environmental influences on the "parent" can be transmitted to the "children." The Russian scientist T. D. Lysenko is one of the most famous proponents of this theory, which is believed to have influenced Russian research. The environment rather than the gene and chromosome, the commonly accepted explanation for inherited characteristics, thus becomes very important. Most of Lysenko's theories and work are at odds with that of Western geneticists.)

Treated wheat seed has already been grown commercially in Bulgaria, China and the Volga River Basin. Under drought conditions, the increase in yield over untreated seed has ranged from 10% to 40%. Some seeds do not respond to the treatment, however. Treated oat seed gave a reduced yield.

The Russian scientist made no attempt to explain how the environment-induced drought resistance persists through several generations. Even though resistance does last, he said, each lot of seed is treated before planting. Sunflowers, oat, barley, millet and tomatoes were among the plants tested.

The wet-dry method of building drought resistance is the result of some 25 years of research, Dr. Henckel said. Russian scientists are also working on similar environmental studies for making plants salt- or heat-resistant.

A seed, which is actually a young plant, is extremely plastic, Dr. Henckel pointed out. Its metabolism and respiration rate are high. The protoplasm, basic life "stuff," of a seed might be described as impressionable. Because of this, Dr. Henckel explained, changes affecting the protoplasm can be found in the mature plant.

"The ability of the plant to be dehydrated is dependent on the eleasticity of protoplasm and on the possibility of maintaining synthetic ability during drought," Dr. Henckel said. He reported on results of his research to scientists attending the 9th International Botanical Congress in Montreal, Canada.

Some Western scientists are also working on the inheritance of environmental effects. Prof. G. Krotkov, head of the biology department at Canada's Queen's University, Kingston, pointed out that it had been difficult to repeat Russian experiments. United States researchers have reported that high temperature effects are transmitted through the pea. Apparently, the high temperature's harmful effects are transmitted through the protoplasm in the plant's pollen. The whole question of such "inheritance" is still a controversial one, however.

MICRONUTRITION—The effect of the trace element molybdenum on plant growth is demonstrated by farmer Markus Koch of Sikeston, Mo., with his soybean crop. Some treated plants averaged six to seven inches higher than untreated ones.

PLANTS RESPOND to recorded music with significant growth increases, an Indian scientist told the Botanical Congress.

For a half-hour daily, between five and six o'clock in the evening, native climbing shrubs of the Pothos family "listened" to recorded flute music. They listened every day for 30 days to the piece which was played by a leading Indian flutist, Dr. Stella Ponniah of Tiruchirapalli, India, reported. The same number of plants of "almost the same vigor and height" were grown without the benfit of music as a control for the experiment.

At the end of the experiment, extraordinary increases in plant growth were observed, Dr. Ponniah said. Average height increased by 25%; average number of leaves by 50%; and average length and breadth of leaves by 30% over the plants not exposed to the music. There was also about twice as many roots on the treated plants.

There has been no other work reported, so far as she knows, on plant growth as related to recorded music. During the past eight years, Dr. Ponniah said, researchers in India have been studying the effects of "live" music on the growth of plants.

HEALTHY, strong-looking timber may house an important disease-causing plant.

Some 3,000 mine workers in South Africa came down with sporotrichosis before it was realized that the supposedly sound mine timbers contained mature spores of the fungus *Sporotrichum schenckii*. The fungus causes lesions on the skin and can spread along the lymph channels, internal organs and even the bones, Dr. Rebecca Brown told botanists at the Congress.

Control measures were effective in killing the fungus, said Dr. Brown. She is with the Transvaal Chamber of Mines Timber Research Laboratory in Johannesburg.

Further research showed that in older seasoned wood, the fungus is eliminated by most of the wood-destroying fungi commonly found in mines.

Another case of a fungus causing disease in man was reported by an American researcher.

Sudden outbreaks of an acute respiratory infection—pneumonitis—have been reported among workers wrecking old buildings, Dr. Chester W. Emmons of the National Institutes of Health, Bethesda, Md., said. These have been traced to the microscopic fungus *Cryptococcus neoformans*.

Virulent strains of the fungus were found in the droppings and nests of pigeons that had lived in the attics of the old buildings for many years. Dr. Emmons suggests these strains could be the source for local outbreaks of pneumonitis. He estimates some 50 to 60 deaths—at least—are caused by the fungus each year.

PUBLIC HEALTH

Demand General Practice

THE PUBLIC will demand an about face from the medical profession soon, calling for more general practitioners and fewer specilists, a psychiatrist predicts.

Individuals want their doctor to recognize and respond to the emotional needs of the patient, Dr. Daniel Blain, California Department of Mental Hygiene, reports in *GP* (Aug.), journal of the American Academy of General Practice.

However, today's emphasis is upon more specialization, more and more carving of the patient into definite areas and a tendency to treat only one of these areas. Doctors tend to pay more attention to the patient's X-rays and microscopic evidence than to their reaction to the patient himself or to a general observation of the patient.

Queries to 3,500 national leaders representing virtually all the professions and leaders in America today resulted in rather consistent responses to questions on how they expected doctors to help meet the emotional needs of people.

If their answers are an indication of the national state of mind, the nation is upset, disturbed, irritated, tense and insecure, Dr. Blain says. Here are the ten most popular suggestions that the 3,500 returned:

1. Doctors should have more general knowledge of psychologic medicine and a greater awareness of the prevalence of emotional problems.

2. The "assembly line" approach in many doctors' offices should be reduced.

3. Doctors should become friends and counselors, and become good listeners.

4. More doctors should be in general practice.

5. They should have a sympathetic understanding of the patient as a human being.

6. Doctors should have better training in the social sciences.

7. They should help guide teen-agers and be able to recognize disturbances that lead to delinquency and crime.

8. Doctors should establish better relationship with their patients than can be accomplished in the professional atmosphere of the examining room.

9. They should refer their clients to family service agencies that could act helpfully.

10. Doctors should be aware of financial problems and the anxiety caused by medical costs.

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ARCHAEOLOGY

Date Rocks and Pottery

A DIFFERENT technique for measuring the age of prehistoric rocks, pottery, ceramics and lava flows has been developed by Dr. George C. Kennedy of the University of California, Los Angeles.

The technique, based on heating a previously fired object and measuring its light glow, can now give approximate dates to objects up to 500,000 years old, and the range may eventually be extended to 2,000,000 years.

Dr. Kennedy explains his method by analyzing a piece of lava rock found on the coast of Alaska.

When the rock is heated to a temperature of about 800 degrees Fahrenheit under a sensitive photomultiplier vacuum tube the heat releases a light, called the thermoluminescent glow.

By taking the rock's total glow and mean radioactivity, both easily measured, Dr. Kennedy fixes the number of years since the rock was last heated. Basically, his formula reads: Age of rock equals glow divided by mean radioactivity.

In the example, he found that the Alaska lava must have come from a volcano which erupted 200,000 years ago.

The glow technique gives archaeologists another highly effective tool in addition to the carbon-14 "atomic time clock" method developed by Dr. Willard F. Libby of UCLA, which dates organic matter up to 25,000 years old.

A hobby led 39-year-old Dr. Kennedy, one of the country's leading experts on volcanoes, to the dating technique.

While investigating volcanoes in Mexico, he became fascinated with the small fired terra cotta figures and effigies buried in Indian graves of pre-Columbian times.

He gradually built up a collection, now considered one of the finest in the United States. Dr. Kennedy began to wonder about the exact ages of his figures, and not finding the information anywhere else, decided to develop his own answers.

During the coming year, Dr. Kennedy will check and refine his technique by measuring pottery from dated sites in Mexico, Greece, and the Near East, and comparing his results with the already established dates.

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ASTRONOMY

Sun Has Large Cloud Of Invisible Comets

THE SUN is surrounded by a large cloud of comets, most of them at such vast distances they are invisible from earth.

These comets may have been formed at the same time as other members of the sun's system from the original gaseous cloud, and with further growth might have become asteroids or even planets. Thus studies of comets can provide much insight into the origin of the solar system.

Comets have very low temperatures. They are believed to be composed of icy mixtures of frozen matter. Even when comets approach relatively close to the sun, they remain extremely cold. Their temperatures then reach only to about 190 degrees below zero Fahrenheit, due to the cooling effect when the comet's volatile gases are released by solar heating, Dr. Bertram Donn of Wayne State University, Detroit, has calculated.

Because comets are so cold throughout their lifetimes, they probably have not undergone any extensive chemical changes since their formation from the original solar nebula. This report appears in *Sky and Telescope* (Aug.).

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ENGINEERING

Post Office "Automatized"

Improved postal service for both large and small communities is foreseen with the development and use of various automatic devices for processing the mail.

BETTER POST office service is in store for small towns as well as big cities.

Some automatic mail-handling machines displayed in the Post Office Department's building are destined for ultimate use in communities of 5,000 population as well as 5,000,000.

Postmaster General Arthur E. Summerfield cited in particular a parcel post acceptance machine for use in towns where the Post Office Department now considers it unjustifiable to keep a man on duty 24 hours a day.

This machine, one of 21 postal improvements on exhibit, could be on duty day and night. You simply put the parcel in the machine on a scales platform, dial the zone number the parcel is being mailed to, punch in how much insurance you want, put in your money and get your change. The machine does the rest and your package is mailed.

Another machine that may find widespread use throughout the United States is an automatic vendor of money orders. Another vendor sells stamps, postal cards, envelopes and stationery.

Mr. Summerfield's announcement that a new, fully-automated post office is scheduled for Oakland, Calif., to handle West Coast and Pacific-going mail, is part of the Post Office Department's crash plan to "catch up" with the present and foreseeable mail situation.

He said U.S. post offices handled 61,000,000,000 pieces of mail last year and that double that volume is foreseeable. Meanwhile, until recently, Congress had made no appropriations for new buildings since 1938. The Department is now getting three new post office buildings a day and expects to be getting six a day by the end of the year.

Mr. Summerfield foresees many "self-service post offices," which would offer lock box service, and contain patron-operated machines. These proposed post offices could be unattended, but serviced about four times a day by a nearby main station, he said.

Bigger post offices may get such highly automated equipment as conveyors, machines that can read typed or printed addresses with an efficiency of 75%, machines that can face and cancel 30,000 pieces of mail an hour and machines that can sort 3,000 pieces to 300 destinations an hour. Each machine is considered a "module," and by combining the proper number of modules, any mail volume can be handled, he said.

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ASTRONOMY

Total Solar Eclipse Due

Eastern Massachusetts, the Canary Islands, the Sahara, the Sudan and Ethiopia, and the Indian Ocean will be the best viewing area for the October total solar eclipse.

ONE OF the world's most spectacular heavenly displays, a total eclipse of the sun, will occur at sunrise on Oct. 2 in the northeastern United States.

Only those lucky enough to live in or travel to a narrow belt of eastern Massachusetts that includes Boston and southern New Hampshire will be able to see the total phase, weather permitting. Millions in the eastern U. S., however, will be able to view a partial eclipse, if clouds do not interfere.

The sun will be wholly covered by the moon for watchers in a narrow strip extending from Massachusetts across the Atlantic Ocean to the Canary Islands, then through the Sahara Desert, the Sudan and Ethiopia, ending in the Indian Ocean. The eclipse occurs at 5:50 a.m. E.S.T. in the Boston area.

Outside this ribbon, observers will see the sun partially eclipsed over a vast area reaching from Greenland to the southern part of Africa, and from Michigan to Moscow.

Over the eastern United States, the sun will already be blotted out when it rises. In New York, for instance, the partial eclipse ends about an hour after sunrise, while in Ann Arbor, Mich., it is finished only 16 minutes after sunrise.

Because the sun will be so low on the horizon from the Boston area during the total phase, scientific studies will be hindered by the extreme thickness of the atmosphere through which the eclipse must be viewed. Much more suitable observations can be made from the Canary Islands, a Spanish possession near the coast of northwest Africa.

Conducting eclipse studies there will be teams of scientists from Sacramento Peak Observatory, Sunspot, N. Mex., the High Altitude Observatory, Boulder, Colo., the University of Minnesota, the University of Wisconsin, the National Bureau of Standards Boulder Laboratories and the Naval Research Laboratory. Youngest astronomer on these teams will be Tim Wyngaard, a 17-year-old school boy of Madison, Wis., who has been sponsored by the National Academy of Sciences as junior member of an observing team.

Details on needful observations amateurs can make are outlined in *Sky and Telescope* (Aug.). A total solar eclipse occurs when the moon comes between the earth and the sun, blotting out the sun's light for a brief time for those in a narrow path on the earth's surface.

Science News Letter, September 5, 1959

FACER-CANCELER — A new machine, capable of facing and canceling letters up to 500 a minute, is one of the devices breaking postal bottlenecks.

CHEMISTRY

Tough Metal Coatings Made From Soybean Oil

FILMS MADE from soybean and linseed oils have been shown to provide tough, flexible coatings for aluminum and black iron.

Chemists at the Agricutural Research Service northern utilization research and development division at Peoria, Ill., reacted fatty alcohols produced from soybean and linseed oils with welding-grade acetylene to produce vinyl ethers. By polymerization the vinyl ethers were joined together to form giant molecules that make up the films.

The coating films are flexible and withstand heat. They resist abrasion, alkalis, acid and such solvents as alcohols, mineral oil and benzene. These properties make them very well-suited for metal coatings.

Soybean and linseed oil films also may be used in adhesives, concrete and masonry paint, the USDA says. The research on the metal coatings is still in the laboratory stage.

Science News Letter, September 5, 1959

BOTANY

Propose Sub-Arctic Colony

IF YOU do not like crowds or hot weather, pastoral life in the sub-Arctic may be just the thing for you.

There is no reason why the Canadian sub-Arctic, a land of caribou moss and scrubby trees roughly extending from the 50th to the 55th parallel, could not support a population of some 100,000 persons, Prof. Jacques Rousseau told SCIENCE SERVICE. Today, he estimates, there are about 15,000 persons, including the native Indians and Eskimos.

"We can grow plants in the sub-Arctic, although we have done little research on the problem as yet," the Canadian botanist said. The soil is generally good, with permafrost appearing only in scattered spots. On the average during the growing season, there is a maximum of 18 hours of sunlight. This can mean three months growth in one month, Prof. Rousseau explained.

No plants of economic importance are found now in the sub-Arctic, he explained. A possible exception is the cranberry-like lingonberry which could be exported. Man would have to create the desired plants through breeding and selection from plants now being cultivated. Crops probably never would be exported from the sub-Arctic. However, by growing their own food plants, the inhabitants would save the cost of bringing in their fruits and vegetables, often done by plane now.

Prof. Rousseau sees little hope of domesticating wild animals found in the region. The yak, and animals of that type, might adapt to the sub-Arctic, however. He foresaw a kind of yak-cow as contributing to the sub-Arctic farmer's food needs.

Most of the temperate zone plants could be adapted to the farmer's garden, Prof. Rousseau said. Cabbages could be grown in 50 to 60 days, corn in 55 days. He sees no hope for growing wheat, however. Greenhouses would have an important place in the garden.

A community of lava rock houses clustered around the general store, church and school with greenhouses, small gardens and a yak in every yard—this is the sub-Arctic of 1980.

Prof. Rousseau described the Canadian Arctic and sub-Arctic plant life to scientists attending the 9th International Botanical Congress. He has made some nine exploratory surveys of the region, several of them a "first look" at the land.

In concluding his lecture to the botanists, Prof. Rousseau pointed out that it impossible to consider any plant association without referring to man. Man is always the main species in the biological association, even in the Arctic.

Science News Letter, September 5, 1959

DEMOGRAPHY

Need Better Agriculture

SEAWEED and algae are not the miracles that will dampen the fuse on the "O-bomb," "O" for overpopulation, that is now threatening to explode.

Neither will turning tropical jungles or barren deserts into farmlands provide enough food for the millions of people. The main hope for feeding them will come from increasing future plant productivity per unit area throughout the world.

This is what Dr. E. C. Stakman, plant pathologist at the University of Minnesota, told scientists at the Botanical Congress.

"Plants hold the basic patents on which depends man's earthly existence," he said. Because of this, "Botanists are among the most important people in the world, for it is they who are the explorers, the interpreters and the reformers in the plant kingdom."

During the ten-day conference, he pointed out, the world population will be increased by "another Montreal." Close to 1,300,000 more persons will need to be fed.

Right now there are many serious problems and difficulties in using foods such as seaweed and algae. Cost, engineering, methods of cultivation are some of the unknowns. It is doubtful, Dr. Stakman indicated, that the pressing urgency of feeding 45,000,000 new mouths a year can be met by these crops. There are some prospects, but few certainties, that substantial areas of new lands can be provided for agriculture, the American botanist said.

Birth control, which many persons advocate as an answer to overpopulation, is not only difficult to implement, it does not answer to present overpopulation problem.

However, there are three basic ways in which agricultural productivity can be increased: 1. breeding and selecting better plants; 2. improved plant nutrition; 3. improved plant protection. With research directed to these fields, significant increases in food production can be achieved in a relatively short time, Dr. Stakman said.

The past has already shown what can be done with "breeding, feeding and protection," he pointed out.

Strains of corn and wheat, bred especially to survive drought, disease and other catastrophies, have virtually doubled yields and made it possible to grow crops in supposedly unsuitable regions. Adding micronutrients to the soil can increase crop yields many times, As an example, Dr. Stakman said that the addition of one pound an acre of ammonium molybdenate to soil that had been fertilized increased the yield of one kind of clover ten times.

The best-bred and best-fed crop will be useless for food if it is not protected to insure that the increased yield will be maintained from year to year. Even in the U. S., the botanist said, yields from important economic crops will vary greatly.

In the underdeveloped countries, where maintaining the food supply is almost always a precarious endeavor, an unforeseen storm or insect plague can be disastrous. These countries, Dr. Stakman suggested, might do well to devote some 75% of their research funds to preventing or alleviating the physical hunger of the people.

"There is need for experimentation to determine when and where the facts and principles revealed by research can be applied to the solution of the food problem," he said. International institutes to study basic and regional botanical problems related to the food problem could help.

Research devoted to food production on a scale comparable to a single atomic energy research laboratory and installation is what we need, Dr. Stakman said. This is the service that botanists can render to society.

Science News Letter, September 5, 1959

PHOTOGRAPHY

Air-Living Fungus Can Plague Photographers

A PLANT that can live on air is causing camera "bugs" a lot of trouble.

How a tiny fungus can live on the glass in camera lenses, causing clouding of the lens, was described to scientists at the Botanical Congress.

The fungus, which has the formidable name *Aspergillus glaucus var. Tonophilus*, is apparently unique in its ability to thrive on glass and metal surfaces that are perfectly clean, said Dr. T. Ohtsuki of Ochanomizu University, Tokyo, Japan. In more than 15 years of research on the problem, the Japanese botanist has been unable to find another fungus, even among very closely related species, that can live on air.

In his experiments, Dr. Ohtsuki said, he soaked pieces of glass in chrom-sulfuric acid, thus freeing the glass from all organic substances. The fungus grew only when the relative humidity was between 60% and 95%; it will never grow when it is more than 95%. Dr. Ohtsuki explained that the fungus spores can germinate and grow "to some extent" by using its own stored nutrients. However, there are usually minute dust particles and other organic substances on lenses of optical instruments that supply the fungus foods needed for further growth. Tiny drops of water are exuded along the tiny-thread-like hyphae. The water also contains acids such as oxalic acid, citric acid and acetic acid which probably corrode glass. Iron is also rusted by the fungus. It is remarkable, Dr. Ohtsuki said, that the microscopically observed outline of the rust bears a "striking resemblance" to the fungal mycelium.

The Japanese researcher told SCIENCE SERVICE that he has developed a "fuming substance," a chemical which he has patented, that will keep the fungus off glass or metal for ten years. It will not harm the lens system of a camera, for example, but will eliminate the need for periodic cleaning of the lens, which is an expensive process.

Science News Letter, September 5, 1959

MEDICINE

Jelly Contains Antibiotic

The controversial royal jelly, a food given only to the prospective queen bee, has been found to contain an antibiotic effective against microorganisms causing infections.

ROYAL JELLY has been found to contain an antibiotic that is approximately one-fourth as active as penicillin.

Three researchers in Baton Rouge, La., have discovered that this food, fed only to the bee chosen to become a queen of the hive, contains an antibiotic capable of stemming the growth of microoganisms that produce skin and intestinal infections.

This includes those infections that cause welts and boils, Dr. Murray S. Blum of Louisiana State University told SCIENCE SERVICE. Therefore, it is possible there is some merit to the use of royal jelly in cosmetics, but this remains to be shown.

"Royal jelly is such a sticky subject, that it is hard to predict just what, if any, benefits might accrue from its use," Dr. Blum said. The Federal Trade Commission and Food and Drug Administration have consistently warned manufacturers of royal jelly against false claims for their products. More than a year ago, royal jelly was advertised as a beautifier, youth restorer and health food.

Dr. Blum and his co-workers, Dr. Arthur Novak of the chemistry and biochemistry departments, and Stephen Taber, III, U. S. Department of Agriculture in Baton Rouge, explained the antibiotic activity diminishes with age. Therefore, just what amount of the jelly could be helpful for any period of time remains unknown. Neither do they make any claims concerning the cure of intestinal infections. Tests carried out to date on microorganisms in the laboratory indicate the jelly contains an antibiotic that will inhibit the growth of certain organisms growing in laboratory cultures only, they stressed. There are many strains of each disease-producing microorganisms that, over a period of time, seem to develop or lose resistance to these antibiotics, Dr. Novak explained.

It appears insects are individual "drug houses," capable of producing drugs that help them control those organisms within their environment, Dr. Blum said.

Last year when royal jelly claims were put forth most persistently, U. S. Department of Agriculture scientists said that most of the claims for royal jelly were unwarranted and not backed by clinical research. Reputable scientists have been unable to find any trace of most of the European scientists quoted in many advertisements for royal jelly, James I. Hambleton of the U. S. Department of Agriculture's beekeeping section said at that time.

The experiment of the three Baton Rouge investigators, reported in *Science* (Aug. 21), is one of several independent research projects now underway in this country. The U. S. Department of Agriculture is also studying the by-products of honeybees. The Baton Rouge researchers are investigating the by-products of southern fire ants and stinging ants.

Science News Letter, September 5, 1959

ENGINEERING

A-Powered Town in Ice

An underground town, powered by atomic energy, is being built by the U. S. Army under the Greenland Ice Cap. One hundred men will be able to live there.

THE UNITED States Army is constructing a small atomic-powered town beneath the surface of the Greenland Ice Cap.

Scheduled for completion in 1960, the town will be situated 138 miles inland from the western edge of the huge ice blanket that covers all of Greenland except some narrow coastal strips.

It will provide year-round facilities for 100 men.

The Army expects to build a sub-surface ice road connecting the town with Camp Tuto, near the sprawling Thule Air Force Base.

The town will be named Camp Century, because it originally was expected to be 100 miles from Camp Tuto.

The main sub-surface trench, 1,000 feet long, has been completed. Also finished is one of several planned lateral trenches which will resemble side streets branching off a thoroughfare.

Construction and future maintenance is under direction of the newly organized Army Polar Research and Development Center, a division of the Corps of Engineers. When completed, Camp Century will be staffed by men under the Chief of Research and Development, which has no direct connection with the Engineers.

The dimensions of Camp Century will be approximately 1,000 by 800 feet. All of it will be under the surface except for a few air vents and escape hatches.

The trenches are being dug by teams of large rotary snow plows. By starting with a narrow, shallow trench and making successively deeper and wider undercuts, the plows rapidly finish trenches 22 feet deep and 22 feet wide. Snow discarded by the plows is swept back over the narrow opening at the top and forms an exremely rigid roof.

Five years of Arctic research by the Army Engineers has resulted in this cut-and-cover technique, which can progress five miles a day. The same technique will be used in the 138-mile Century-Tuto roadway.

Caverns will be cut into the trench walls with equipment developed from mechanical coal-mining machinery.

Maintenance Problem

Century will present an unusual maintenance problem. Natural plastic movement of the ice will cause the walls to close in slowly and also may twist the entire area out of shape. To prevent the camp from becoming useless after a number of years, the ice will have to be shaved away periodically.

Announcement of Camp Century project is expected to be released by official Army sources momentarily. The camp is being constructed with approval of the Government of Denmark, of which Greenland is a possession. The use of atomic energy is still under negotiation, but, according to sources well-acquainted with the matter, the Danes are expected to authorize the Army to bring in a reactor.

Early this year, the Department of Defense announced it was working on a portable, pre-fabricated nuclear power plant for supplying heat and electric power in "remote places." Speculation has it that this will be the Camp Century reactor.

Century A-Power

The reactor has a 1,500-kilowatt capacity and is expected to operate a full year on a 10-pound core of uranium-235. It will be cheaper to run than a fuel oil power plant. Fuel oil ordinarily costs approximately $1 a barrel. Transportation to Greenland would add about $42 to the cost.

Since 1957, the Army has been training men in the operation of nuclear reactors at Fort Belvoir, Va. Presumably, some of these men will operate the Century reactor.

The camp will contain laboratories for most of the Army technical services, such as signal, medical, ordnance, quartermaster, transportation, engineering, and the Snow, Ice, and Permafrost Research Establishment. Formerly, the scientists connected with these services had to clear out of Greenland before winter set in. Camp Century will enable them to work in relative comfort year-round.

Included at the camp will be a ten-bed hospital, equipped with an operating room. As well as living quarters, there will be complete dining and kitchen facilities. Refrigerated storage for food will be no problem.

Other facilities will include recreational areas, a post exchange, warehouses, and repair and maintenance shops.

Science News Letter, September 5, 1959

AGRICULTURE

Study Salt Water Farming

DOUBLE THE agriculture potential of the earth with one single stroke—that is what salty water can do.

A whole new continent could be added to the world, Dr. Hugo Boyko of Israel told SCIENCE SERVICE. He presented a paper on a method of salt water irrigation to scientists attending the 9th International Botanical Congress in Montreal, Canada.

For many years now, Dr. Boyko said, an experimental garden has been flourishing in the desert, watered only with brackish water from a saline spring. The soil is 61% granite and limestone pebbles and rocks, with about 23% coarse sand. No fertilizer is applied, the Israeli researcher said, yet pomegranates, mulberry trees, sycamores and olive trees are thriving. Altogether there are some 180 species of trees, shrubs and other plants, selected for their drought-resistance and usually originating from arid and semi-arid Mediterranean regions.

These plants are living proof that desert soil and salt water can support an agriculture, Dr. Boyko explained. Farmers are used to associating salt or sea water with destruction of their crops. Also sandy or gravely soil is usually thought of as not being farm land. The two "evils," salt water and so-called bad soil, can be combined to give millions of acres of land for agriculture.

There is a good reason for this: salt water percolates through the coarse soil so that the plant's roots do not stand in the salty water. Effectively, the plant has all the benefit of the salt water without any of the harm.

Plants in the experimental garden were irrigated with water whose salt content ranged from 2,500 to 6,000 parts per million of salt per liter of water. The amount varied with the season, Dr. Boyko explained. This saltiness is enough to make a person sick if he were to drink it.

The only species that failed to survive under this irrigation were those with short root systems. The other plants were able to go three weeks, during an unusual drought, without irrigation. Actually, Dr. Boyko said, the plants needed less water than "you would suppose." Once a week was enough. Plants could also be irrigated with fresh water, following the salt water, without harm.

The salt does not accumulate since it passes down through the coarse soil. When it reaches bed rock, Dr. Boyko explained, the salt is carried out to the sea.

Shifting sand dunes can also support a crop. Barley, sugar beets, wheat, grass and Israeli esparto grass, which is used in paper making, can all be grown, Dr. Boyko said. These are all important economic crops. Water with a salt content higher than the Sahara's underground resources of brackish water was used for irrigation. It will thus be possible to "productivize" the arid and semi-arid lands throughout the world, Dr. Boyko said.

Science News Letter, September 5, 1959

ENGINEERING

Predict Use of H-Power

DIRECT conversion of controlled thermonuclear power to electricity is believed practical in the future, a scientist told a symposium on the dynamics of conducting gases.

Dr. Joseph L. Neuringer, of Republic Aviation Corporation's plasma propulsion project, Farmingdale, N. Y., said he had made a theoretical attack on the problem of extracting power from a gas contained by a magnetic field. He reported solutions for two special cases of the problem.

The conventional steam-turbine method of generating electricity is probably not the most practical and efficient way for using the energy liberated by controlled thermonuclear reactions, he said, since this involves moving parts of heavy, cumbersome machinery.

A method not involving moving parts is to generate the electricity by electromagnetic induction using the highly conducting gas of the thermonuclear reactions as the working fluid. This is the type of generator, he said, that may prove practical in the future. The symposium, which met at Evanston, Ill., was sponsored by the American Rocket Society and Northwestern University.

THE ABSENCE of smog in the populous, automobile-rich areas of the land will become a measure of man's skill and competence in solving the stability of chemical products, such as automotive fuels. Sir Hugh Taylor, Princeton chemist, now president of the Woodrow Wilson National Fellowship Foundation, told this to the gas dynamics symposium in Evanston, Ill., of the American Rocket Society and Northwestern University.

It used to be said that the civilization of a country could be measured by the amount of sulfuric acid produced, but Sir Hugh suggests that synthetic ammonia would now be a more appropriate measuring stick. An iron catalyst, a chemical that promotes chemical combination of the excessively inert mixtures of nitrogen and hydrogen, facilitates the synthesis of ammonia.

Potential energy barriers have become enmeshed in problems of national security, Sir Hugh explained, because it has been possible to solve the problem of stability in materials that were once considered highly susceptible to decomposition. Some of these materials are hydrogen peroxide, nitrogen tetroxide, ozone, and various atoms and free radicals, in which the stability hinges on the potential energy barriers separating the reactants and products.

Hydrogen peroxide in concentrations greater than 90% is stored now in 25,000 gallon tanks and safely transported in 8,000 gallon tank cars, but this has required the most discriminating care in the selection of materials for containers, valves, lines and pumps.

Science News Letter, September 5, 1959

PSYCHOLOGY

Mice Bred in Psychology Laboratory Score Lower

MICE BRED and raised in the Behavior Laboratory at the Roscoe B. Jackson Memorial Laboratory, Bar Harbor, Me., score lower on simple learning (conditioning) experiments than do a separated line of mice bred in the Main Laboratory of the institution.

The difference is due to heredity and not to the kind of care they receive or the psychological environment, Dr. Victor H. Denenberg, psychologist of Purdue University and the Jackson Memorial Laboratory, indicated in reporting the two mice substrains in *Science* (Aug. 21).

The hereditary source of the superiority of the Main Laboratory colony mice was established by moving mother mice to the psychology laboratory before the birth of the young and keeping the babies there until they were tested at 50 days of age.

These mice also did better on the simple learning tests than the Behavior Laboratory animals.

The two colonies of mice have been bred separately for 30 generations and during this time it is quite likely that a mutation took place which accounts for the differences observed.

These two psychologically different substrains should be useful for experiments on the genetics of behavior, Dr. Denenberg points out.

Science News Letter, September 5, 1959

TECHNOLOGY

Sapphires Brewed In "Pressure Cooker"

WHITE SAPPHIRES more nearly perfect than natural ones are being brewed in a "pressure cooker," at Bell Telephone Laboratories, Murray Hill, N. J.

To cook a batch of gems, some "seed" sapphires are heated under pressure in an autoclave with aluminum oxide and a solution of water and washing soda. The heat and high pressure dissolve the aluminum oxide and cause it to grow onto the seeds thus adding to their size.

Natural sapphires take thousands of years to grow, but these man-made gems are ready within a month, Bell scientists pointed out.

The gems, free of strain, have many industrial uses. Bell Laboratories are using the sapphires in research projects aimed at improving telephony and communications in general.

Science News Letter, September 5, 1959

Science for Youth

OVER 600,000 BOYS AND GIRLS PARTICIPATE

in this international program for encouraging science talent. The Youth of Today will become our Scientists of Tomorrow through the motivation and stimulation of these SCIENCE SERVICE activities . . .

SCIENCE CLUBS OF AMERICA

NATIONAL SCIENCE FAIR • SCIENCE TALENT SEARCH

Science Youth Program

Extensive national and international movement directed by Science Service to stimulate and give scientific experience to the youth of the world.

MORE THAN 600,000 students are members of some 25,000 groups, largely in high schools, affiliated with Science Clubs of America, a Science Service activity. Any adult, whether science teacher or club leader, can affiliate a science club without charge.

Individual projects and experiments by young scientists are shown in exhibits prepared for the thousands of school science fairs held each spring. The best of the exhibits in high school fairs are selected to compete in about 185 area and regional fairs which are affiliated with the National Science Fair. Each of these fairs sends not more than two of its top exhibitors to the National Science Fair, the eleventh of which will be held in Indianapolis, Ind., May 11 to 14, 1960 (subsequent National Science Fairs will be Kansas City in 1961 and Seattle in 1962). Thousands of professional scientists, engineers and educators advise student scientists on their projects, and panels of these experts serve as judges at local, regional and national fairs.

Science Fair Committees are organized to conduct local and regional science fairs in cooperation with public, private and parochial school systems, colleges, research institutions, industries, professional science, engineering and educational societies, newspapers, civic clubs, museums and other agencies.

The Science Talent Search for the Westinghouse Science Scholarships and Awards, conducted by Science Clubs of America, is the pioneer top-level competition to select from the nation's high school seniors those giving promise of being the creative scientists of tomorrow. Conducted during the fall of 1959 for the 19th time, the Science Talent Search uses a science aptitude test on a nation-wide basis to select over 400 boys and girls for honors. Forty members of this Honors Group are designated Winners and invited to Washington for a five-day Institute at which $34,250 in scholarships and awards are given.

Through special arrangement with Science Clubs of America, State Science Talent Searches are conducted in 35 states, usually by academies of science or universities.

Records of achievement of Science Talent Search winners over the years show that 100% go to college and about half of these now old enough have earned their doctorates or are about to do so.

Both of these activities, the National Science Fair and the Science Talent Search, are approved by the Committee on National Contests and Activities of the National Association of Secondary-School Principals.

As part of the National Science Youth Program, Science Service develops and distributes experimental kits at low cost, books and pamphlets promoting scientific experimentation; provides basic and background information in all fields of science; cooperates with many organizations in their science youth programs. Support from the National Science Foundation and other groups is obtained to materialize and implement mutual objectives in science education, particularly in secondary schools.

Other major activities of Science Service contribute to the National Science Youth Program. Science Service's service to newspapers reaching a total circulation of over 10,000,000, informs teen-age science enthusiasts as well as the general public. SCIENCE NEWS LETTER with a growing circulation of over 70,000 reaches a select audience of non-scientists and scientists alike, including many science teachers, college professors and research scientists.

THINGS of science, experimental kits containing unusual specimens or explaining experimentally processes through which a familiar product passes, has been issued monthly for 20 years. Now being produced at 30,000 a month, these kits have introduced many young people to the joys and techniques of science experimentation. CHEMISTRY, issued monthly during the school year, brings particularly to high school teachers the latest in its important field.

"October—National Science Youth Month" was inaugurated and sponsored by Science Service as a means of catalyzing the beginning of science youth activities during the school year and enlisting the cooperation of diverse organizations engaged in science youth activities.

Science Service, 1719 N Street, N.W., Washington 6, D. C., invites the cooperation of organizations and individuals in extending science youth activities, particularly in regions where science fairs and clubs are not yet developed.

Information and suggestions will be furnished upon inquiry to Science Service.

Science Clubs of America

Active groups of young scientists who, guided by sponsors to creative experiment, find that "science is fun." Most sponsors of science clubs are teachers.

APPROXIMATELY 25,000 science clubs are affiliated with Science Clubs of America. A current evaluation shows that there are active science clubs at all grade levels, although the largest number are organized on a school-wide basis in senior high schools.

The school clubs plan their activities mainly around biology, chemistry, physics, astronomy, general science, mathematics or some combination of these.

Science club membership averages 22 members, but it ranges from a somewhat exclusive-sounding roster of three members to one all-out activity involving 750 students.

Clubs are sponsored by teachers of every science subject in the curriculum. Most of the teacher sponsors are drawn from the science faculty, but some teach other subjects. General science teachers lead the list with 45%. More than 36% of the sponsors are chemistry teachers.

Clubs also are sponsored by a great variety of people who are entirely outside of the teaching profession. A random sampling turns up an accountant, a Cub Scout den mother, a dentist, an executive of a scientific supply company, a former National Science Fair finalist, and a veterinarian.

About 65% of the clubs report that their members are active in science fairs. Many clubs are chiefly responsible for organizing and conducting their school fairs. Others act as student committees for the large regional science fairs in their areas.

In preparation for annual fairs, science clubs frequently program project workshops and seminars where former science fair winners and professional scientists offer suggestions on project ideas and exhibit techniques. Color slides and movies of the projects at the National Science Fair are shown by many clubs as a source of ideas and a dramatic set of competitive standards.

Some of the great assortment of specialized activities reported by science clubs are photography, geology, medicine, conservation, nuclear science, aeronautics, paleontology, rocketry, civil defense, meteorology, junior museum work, soil sampling, science publications, model building, pet care, mechanics, and studies of scientific careers.

Most club programs and activities are planned and carried out by club members, with the sponsor acting in an advisory capacity. Such a plan allows ample scope for the development of leadership, responsibility, initiative and creative ideas among the student members. The sponsor often is able to act as liaison between the students and community organizations, school administrators, scholarship foundations, scientific libraries and professional societies. In many cases the sponsor supervises groups or individual laboratory experiments.

Affiliating a club with Science Clubs of America is a very simple procedure. All that is required is a note from the sponsor indicating the club's desire to join and to receive materials and information without charge. The Sponsor Handbook, supplied free to sponsors, is revised annually to provide the latest and most complete information on activities for science-minded young people.

Fairs: National—Local

Science Fairs show graphically and effectively the magnitude of creativeness and scientific enterprise of which young scientists are capable.

THE NATIONAL SCIENCE FAIR has developed to its present size and international scope from a beginning of 13 affiliated area fairs in 1950. Even more spectacular is the expansion of the science fair program at local and regional levels. Feeding these, or operating independently, are school fairs which have become so numerous that it is difficult to keep track of them.

A Science Fair is a collection of exhibits, each of which is designed to show a biological, chemical, physical or technical principle, a laboratory or other procedure, an industrial development, or an orderly collection of anything which can be fitted into the broad concept of any branch of any pure or applied science.

Every year millions of people see science exhibits shown by students at science fairs leading to the National Science Fair.

One reason for this growing student interest in science and technology during the past decade is the exciting advance which science has made and is projecting.

Coupled with this is the awareness of educators, from kindergarten through university, that genuine interest in science is sparked at a very early age, often before the first year of school.

Scientific and technical societies, cognizant of the tremendous shortage of skilled scientists and technicians, are encouraging science fair programs for the purpose of recognizing potentials early and because through them additional motivation becomes more easily possible.

Civic and social groups find that science fairs supply an outlet for constructive creativity of youngsters, and see in the fairs a purposeful use for funds accumulated in welfare and other accounts.

Newspapers sense the rich educational service which fairs give to the community. They often sponsor the program and take over, or assist, promotion, arrangements and financing.

Industry sees the fair as an exemplification of the American way of free enterprise. It lends technical experts to the cause, and helps to finance it.

School Fairs

The simplest fair is an exhibition of science projects held in the school itself. There are shown all the experiments, collections, and displays that have been worked out by students either in class or as extra-curricular science club activities. These fairs often are a feature of a meeting or a showing to which the public is invited.

City-wide, Area or Regional Fairs

These large science fairs may have several hundred exhibits, viewed by thousands of people who visit an exhibition hall which may be a school or college gymnasium, an armory, a museum, or other such area. Some science fairs, even in large cities, accept the maximum number of exhibits the hall will allow. In other cases, the city or area fair receives only an allotted number of exhibits from each school which holds its own eliminations first.

Exhibitors in such fairs are rewarded by the stimulation of having their work shown and by receiving certificates of merit. Other awards, ranging from emblems to cash prizes and scholarships, may be given.

The National Science Fair

From regional or state fairs the best exhibits made by individual students (not groups), are selected for entry into the annual National Science Fair.

The rules of the National Science Fair specify that to be eligible boys and girls must be students in the last three years of public, private, parochial or other secondary schools, and must have been selected for highest honors in a regional fair affiliated with the National Science Fair.

Each affiliated fair is entitled to send two finalists and their exhibits to the national fair, paying their expenses and undertaking responsibility for them.

All exhibits must be individual projects and must be limited in size to 48 inches from side to side and 30 inches from front to back. Identical repetition of a project exhibited by the student at a previous year's science fair disqualifies the finalist. However, the project may cover the same field of investigation when a substantial amount of continued and expanded work has been done.

Exhibits must be durably and safely designed and constructed, using approved switches and cords for 110-volt operation. No dangerous chemicals, open flames, explosives or live poisonous reptiles may be exhibited. Live animals must be properly and humanely cared for, and any experimental work that has been done with them must conform with National Science Fair regulations for such experiments. Plants must pass federal and state quarantine regulations.

Honors and Awards

For National Science Fair Awards, exhibits are judged in the two general categories of biological and physical sciences, and the exhibits of girl and boy finalists are judged separately. First place awards are made to the top boy's and girl's projects in each of the two categories. Other awards are pro-rated according to the number of girls and boys among the finalists, regardless of the category of their exhibits.

Each finalist receives a rainbow-ribboned gold and silver medal engraved with his or her name and that of the cooperating organization. A facsimile medal on a certificate is sent to the principal of the school of each finalist to become a trophy in the school.

On the basis of critical judging, outstanding finalists are given "Wish Awards"—selected scientific equipment and materials which winners have "wished for" to help them in the furtherance of their study and experimentation.

Also given at the National Science Fair are two Award Citations and two honorable mentions from the American Medical Association for the best exhibits in the broad field of medical sciences and health. Award Citations carry with them all-expense-paid trips to the annual meeting of the AMA.

Certificates of Superior Achievement, and invitations to exhibit at the annual meeting of the American Dental Association are awarded to the two finalists whose exhibits are considered best in the broad field of science related to dentistry. Certificates of Meritorious Achievement, plus $50 gift certificates toward purchase of scientific equipment are given to two other winners.

A plaque and an invitation to exhibit at the annual American Veterinary Medical Association meeting are awarded to the best exhibitor in this field. A sponsor or educator will accompany the winner. An alternate also is recognized and honored.

U. S. Navy judges honor finalists whose exhibits are considered best in the broad area of Navy-oriented projects. Each fall these finalists join other Navy Science Cruisers (one selected from each regional affiliated fair) for about five days on a highly science-oriented trip on fleet ships at sea.

U. S. Army judges honor finalists whose exhibits are in the specialized areas of missiles, satellites, electronics, electronic calculators, mathematics, high and low temperatures, instrumentation, meteorology and medicine. Finalists are given trips to Army science installations.

Air Force and Air Force Association judges select outstanding exhibits in various categories including air power and air exploration. Two finalists receive recognition and appear with their exhibits at the annual Airpower Panorama.

Judging is based on creative ability, scientific thought, thoroughness, skill, clarity, and dramatic value of each exhibit. Scientists designated by Science Service judge the contest, and the decision of these judges is final in all cases.

While every effort is made to prevent damage to exhibits, neither the National Science Fair, Science Service, the National Science Fair Committee of the host city, nor any other sponsoring organization can assume responsibility for loss or damage.

All finalists participate in a four-day program of scientific sightseeing and meetings with leading scientists as well as the public. At the same time they become acquainted with other finalists having similar interests, compare their work and carry back to their local situations an enthusiasm and stimulation that will be reflected by others in future years.

Educationally Valuable

The whole science program is educationally sound. It allows the student to select freely the project upon which he plans to work. Automatically he leads himself through a study of the bed-rock principles of his chosen topic, thus acquiring a basic, fundamental understanding of the facts and techniques involved. All elements of a stiff competition are present to urge the student to do his best, thus reflecting honors on himself, sponsors, school, city and state.

Educators and newsmen cooperating in the program of the National Science Fair plan the fair in a different city each year. This makes it possible for a finalist who returns to the fair each year he is eligible to visit three different cities, meet the outstanding scientists in each and visit them in their research laboratories. Similar cultural values automatically extend to the accompanying educators and press representatives.

Regional or School Fair Rules

Regional and school science fairs generally use the rules of the National Science Fair or adapt them to fit various local situations.

Depending on local rules, students may work individually or in groups. Exhibits must be designed and made by students. They may seek help from educators and others. Each exhibit should be so arranged that it can be understood by the layman without requiring an accompanying demonstration or lecture. Judgment of exhibits is based on work done by students, not on cost of accessory or incidental equipment.

How to Conduct a Science Fair

The science club sponsor or teacher, or group of sponsors or teachers first should get permission from the principal or board of education for holding a science fair to which parents and the public will be invited.

The fair may be designed for operation in one school, or each school of a group of schools can schedule the event to occur substantially at the same time. The best exhibits may then be presented at a final centralized place.

Fairs should be held early in the spring. If entry is arranged for finalists to participate in the National Science Fair, the regional fair must close early in April. Names of finalists must be reported immediately to the National Science Fair Headquarters, at the close of the regional fair.

Regional fairs may be held in classrooms in school, in the chemistry or physics laboratories, in the school gymnasium or cafeteria, in a community building, college building, museum or armory. In fact, any place where adequate electric current facilities are available and which will accommodate crowds will prove satisfactory. If held in a hall, local police and fire departments should be advised of the event so that guards can be posted to protect the properties adequately. School events should be monitored for protection and to guide people to and from the exhibit areas.

School fairs may be open to students in any year of elementary or secondary school, from kindergarten up, if desired. Exhibits should be so arranged and classified that all those made by students of one grade division may be compared both by the judges and the public. Each exhibit may be made by a group of students or only one student. Group exhibits should be judged apart from those made by individuals.

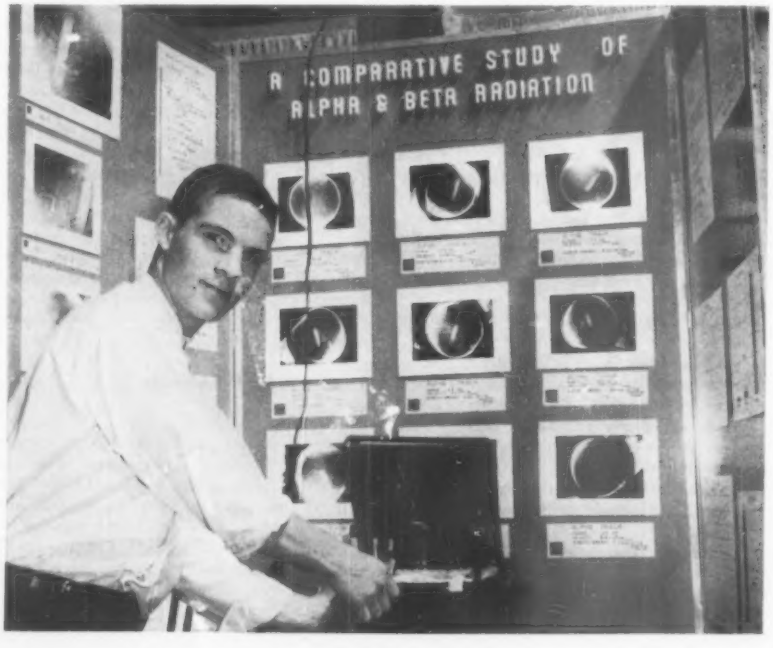
In the upper grades all physics exhibits should be grouped into a class separate from those in chemistry, or biology. The committee should set the limits defined by educational levels, not by age of the student.

Finalists to the National Science Fair must come from the 10th, 11th, or 12th year of a secondary school or equivalent and must have been selected for highest honors in a regional or area fair affiliated with the National Science Fair.

Judges should be people who understand the topic being judged or can approach it open-mindedly. A good combination is a layman, teacher from the same grade but from another school, and a scientist for each division or classification; the layman to tell if he learned something from the exhibit, the teacher to specify if the exhibit represents good work on the part of the student of the specified school year, and the scientist to attest to its technical accuracy. Point scores are recommended. Judges should evaluate exhibits before the show is open to the public.

Anything from a silver star or rubber stamp to more elaborate awards may be made. Often merely the posting of merits will suffice. All exhibits and names of exhibitors, schools, etc., should appear in a list of exhibits. Local townsmen, civic, scientific, or cultural groups, or industry, may present awards. If they are other than certificates, they should be selected so as to further the scientific education of the winners. School plaques or certificates also may be given. Scholarships, if available, should be awarded for scholastic attainments as well as good exhibits.

What has been stated for a school science fair applies to a regional or city-wide fair except that greater numbers are involved and greater attention will be given to each operation.



To properly handle a large scale operation, entry blanks are prepared, instructions are printed and committees are set up to perform definite duties.

Where the space at a large regional fair is limited, run-offs may take place at schools. The final showing to the public of the best exhibits from each school then may be arranged at a central location. Total number invited from each school may be based on total number of students in the school, with minimum of two per school and one additional per "x" number of students.

Although a few state and regional fairs have operated successfully for many years without newspaper association, it is well to have help from a local newspaper. This gives encouragement, inspiration, sharpens the competitive spirit, and provides the public with firsthand information.

A valuable experience for participants at any science fair is to have them meet and talk with scientists, engineers, technologists, and various specialists in their own laboratories or industrial research and field posts. The suggestions, help and guidance these authorities give is always remembered with appreciation.

The already established structure of a Senior or Junior Academy of Science contributes greatly to a coordination of a fair program on both state and regional levels. With regions cooperating directly at the National Science Fair, and the state fair serving to select from those regions which are not yet able to attain national affiliation, the state is assured of adequate representation. At the same time its own state fair becomes increasingly effective and more vital. The National Science Fair does not substitute for a state fair. Instead, it augments it and gives it more purpose and national recognition.

A broad perspective should be taken in the matter of geographical or other boundaries for the fairs. If a newspaper, radio or TV station, college or university, industry or other group, assists toward the financial support of any regional fair, and if any one or all of these are so situated that they normally enjoy the friendship and good will from across state boundary lines, the entire area should be considered in the plans for a regional fair.

One of the goals of the National Science Fair is to permit access to the national event by every student through a cooperating fair within convenient access to his or her school. Long hours of travel are a hardship for young students, and are objected to by parents.

Fairs cooperating in the National Science Fair have shown the same kind of amazing growth which marks the national event. When students learn the kind of competition with which they will be faced, they accept the challenge and demonstrate great abilities. When they are faced with the best throughout the nation, compare notes and gain new ideas, they return with better plans and greater drives. Proof lies in the increasing number of repeat finalists and the more advanced futures toward which they strive.

How to Enter the National Science Fair

Entry to the National Science Fair of exhibits and the students who made them is possible only through a regional, district, or state fair which is affiliated in the National Science Fair program. Affiliation requires signing of a contract with the National Science Fair, the payment of an entry fee, and assurance that the finalists will be properly selected and be sent, all-expenses paid, to the National Science Fair, together with their exhibits. No more than two finalists may be chosen for any one cooperating fair. Exhibits must be made by individual students attending school, and must be declared best in local competition. They must be students in the last three years of secondary school.

Announcement that any fair is sending finalists to the National Science Fair should be made only after contracts have been signed and before the fair is held so that all students may share equally the incentives and rewards.

Science fairs which are affiliated with National Science Fair are privileged and expected to indicate cooperation with Science Service, Science Clubs of America, and the National Science Fair, by reference in literature and use of insignia.

Whether the fair is purely a school activity or one which involves a large area, rules should be set up which will not be misunderstood.

Criteria for judging exhibits should be established and these should be given publicity so that the entrant will know how the judges will evaluate the exhibits.

Regulations for Experiments With Animals

The following rules have been drawn up in consultation with leaders in the biological and medical sciences.

The basic aim of scientific studies that involve animals is to achieve an understanding of, and a deep respect for, life itself and for all that is living.

A qualified adult supervisor must assume primary responsibility for the purposes and conditions of any experiment that involves living animals.

A trained biological scientist, physician, dentist, or veterinarian must directly supervise any experiment that involves anesthetic drugs or surgical procedure.

Experiments on living animals shall be limited to the use of invertebrates, other non-mammals, and such small mammals as mice, hamsters, guinea pigs, or rabbits. An exception to the above rule is in the case of farm animals, in which case the rules of the local 4-H Club shall be followed. No experiment shall be conducted that involves infection with pathogenic organisms or obviously mutilating surgical procedures, unless the animal is humanely disposed of at the end of the experiment. Any such experiment must be performed with the animal under appropriate anesthesia if pain is involved, and the experiment must be of the briefest possible duration.

The comfort of the animal used in any study shall be a prime concern of the student investigator. Gentle handling, proper feeding, and provision of appropriate sanitary quarters shall at all times be strictly observed. Any experiment in nutritional deficiency may proceed only to the point

where definite symptoms of the deficiency appear. Appropriate measures shall then be taken to correct the deficiency, if such action is feasible. Otherwise, the animal must be humanely disposed of.

Students shall not be permitted to participate in science fairs held under the auspices of Science Clubs of America until their adult sponsors have submitted assurance in writing that the above rules have been observed.

How to Do a Science Project

Students who turn out good science projects usually arrive at the system used by all professional scientists.

Read widely—Your success with science projects depends largely on how much you know about your subject. Wide reading broadens your understanding of the possibilities and limitations of your project. Search your school, public, and nearby university, college and specialized libraries for publications in your project field. Librarians are most willing to help you.

Question others—Scientists draw heavily upon the knowledge of others in their own and related fields. Acquire the habit of consulting with others about your plans. Often a classmate or an adult can point out an error in your thinking or suggest a method which might take you many hours to detect otherwise. Professional scientists and technicians are always glad to help answer your questions if you follow simple rules of courtesy such as querying them when they have time to answer and questioning them only when you have done enough reading and thinking to be able to ask intelligent questions. If you do not abuse their kindness you may, like other young scientists, find adults eager to lend you not only suggestion but also equipment, books, publications, etc., that you might not otherwise be able to secure. It even helps to talk over your project with an intelligent person who knows nothing about your work. In attempting to explain it to him you will be forced to clear your own thinking and his questions may point out things that need more attention for the sake of clarity.

Plan carefully—Scientists save much time and money by planning so thoroughly that the actual experimenting goes through with a minimum of failure. Try to anticipate the difficulties you will encounter and forestall as many as possible by deliberate planning.

And some don'ts—

Don't write some organization to send you everything they have on the subject, or expect them to do your project for you.

Don't tackle such a large project that you have time only to build the instrument you plan to use. If you must build an instrument that you have not tried to build before, better limit your project to that, and present a completed job.

Science Talent Search

Science-minded students offered unusual opportunity for recognition and scholarship assistance toward careers in scientific research.

MANY STUDENTS in junior high school and the early years of senior high school look forward to and prepare for entering the Science Talent Search for the Westinghouse Science Scholarships and Awards when they reach their senior year of high school. This competition discovers, with essential educational cooperation, the youth of America whose scientific skill, talent and ability indicate potential creative originality. Science club and science fair activities have proved to be excellent preparation and background for success in this scholarship competition.

The Science Talent Search is conducted annually by Science Clubs of America as an activity of Science Service in cooperation with the Westinghouse Educational Foundation. It is open to boys and girls who are seniors in public, private or parochial schools in the United States, including Alaska and Hawaii, but excluding U. S. possessions, who are expected by the certifying school officials to complete college entrance qualifications before the following October. Students must not have competed in any previous Science Talent Search.

Each year an Honors Group of approximately ten percent of the fully qualified entrants is chosen for special recognition. Members of the Honors Group receive certificates and recommendations to the colleges and universities of their choice. These recommendations usually result in acceptance of the students for admission as well as scholarships and other financial assistance offered by colleges and universities seeking students of unusual promise in science.

From the Honors Group, the top 40 winners of the Science Talent Search are chosen. These winners are invited to attend the Science Talent Institute held for five days each spring in Washington, D. C., with all arranged expenses paid. During the Institute they are judged for five scholarships of $7,500, $6,000, $5,000, $4,000, and $3,000, and 35 Awards of $250 each.

Each winner receives a bronze Science Talent Search Plaque to be presented to the permanent honors and trophy collection of the winner's school.

Each member of the Honors group receives a Science Talent Search Certificate signifying the honor. The Certificate, suitable for framing, is sent to the school for presentation to the honorable mention. It becomes his or her property.

Committees of judges designated by Science Service will judge the contest, and the decision of these judges shall be final in all cases.

A scholarship may be applied toward a course in science or engineering at a college or university chosen by the winner and approved by a scholarship committee named by Science Service. Science and engineering courses must be within the fields of activity of the National Academy of Sciences and the National Research Council. If a scholarship winner withdraws from college, or if the Scholarship Committee disapproves further use of the scholarship because of reports from the college of unsatisfactory progress, any further benefits from the scholarship are forfeited.

Entering the Science Talent Search

To enter the Science Talent Search the senior takes the science aptitude examination in his own school under the supervision of his sponsor, teacher or other authorized school official. Such persons also prepare recommendations and see that the scholastic record is transmitted. The student writes a report of about 1,000 words on "My Science Project." This should involve original work. Entrants should develop a project that is planned for the Search or adapt to the Search something they already are doing.

Science teachers and school officials qualified to administer the examination may request entry materials for any number of eligible students. Entry blanks are mailed from Washington about Nov. 15. The examinations must be administered early in December.

All entries in the Annual Science Talent Search must reach headquarters of Science Clubs of America in Washington, D. C., by midnight, Dec. 27.

Girls as well as boys are encouraged to enter the Science Talent Search. The number of girls chosen for honors is determined by the proportion of girls who complete entries.

Search Winners Succeed

One of the most frequent questions asked is, "Do Science Talent Search winners really become successful scientists?"

The winners all have attended, or are attending college. With rare exceptions they proceed to bachelors' and about 50% of those who have had time have a doctors' degrees. The educations of these winners have been supported liberally by scholarships and fellowships. Advanced study on fellowships takes many of them abroad.

Membership in such honorary fraternities as Tau Beta Pi, Phi Beta Kappa, and Sigma Xi is so frequent as to be almost standard.

Publication of their work in various scientific journals increases as they proceed with education and research.

Almost every known science has at least one winner specialist. Physics has attracted the largest number. A very small minority choose non-science fields for their careers.

The largest group prefers academic research and teaching. As professors they often have younger winners in their classes or working as their research assistants.

The second largest number now working fulltime is in industry. Research is the most frequent assignment but a few are in sales, production or administration.

Offers of summer employment in research laboratories come to all 40 as soon as they are named winners.

Almost all earlier winners have served in the armed forces but later ones, in general, have been deferred until their education is completed.

Most of the older winners are married and many have four or five children. Science Talent Search women tend to marry scientists and engineers of comparable training or more. The men do not so frequently choose mates in those fields but all have college-trained wives, frequently with degrees to match their own.

All women have worked before marriage; many afterward. Those retired to care for their children express the desire to resume their careers later. Meanwhile they keep up their science themselves and through their husbands' work.

By entering the national Science Talent Search, students automatically enter a state search if held in their state.

Science Talent Search Aids

Back issues of Science Talent Search science aptitude examinations and answers are available as long as the supply lasts. Specify the year desired. Price 15c per copy, answers and passing scores included

Send 50c to cover postage and packing of a bundle of four different past Science Talent Search booklets containing abstracts of winners' papers and other information.

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METEOROLOGY

Predict Distant Storms

A new radar, tailor-made for weather forecasting needs, is being installed at the Washington (D. C.) National Airport where it will improve weather prediction.

BETTER PREDICTIONS of severe weather within a 250-mile radius of the nation's capital will result from use of a new radar now being installed at Washington National Airport.

It is part of a Weather Bureau storm-warning network planned eventually to blanket the United States. The continuously operating radars are tailor-made for weather forecasting needs, including the detection and tracking of hurricanes, tornadoes and other severe storms. The first is now operating in Miami and the Washington radar is scheduled for operation by mid-September.

Some 15 of these sets are expected to be installed in as many locations by the end of the year, with 31 planned for operation by July, 1960. The next four radars, produced by Raytheon Manufacturing Company, Waltham, Mass., are scheduled for installation at New York, Brownsville, Texas, Wilmington, N. C., and Kansas City, Mo.

The new radars also show where and how much rain or snow is falling as it falls, thus enabling weathermen to warn of flash-flood threats much sooner than now possible.

Radar signals bounce off rain or snow drops in storms and are reflected back to the antenna where they are electronically converted to the picture seen on the radar screen. Brilliancy of the image is a measure of the rain's intensity.

Although the Weather Bureau has not revealed where the other 25 radar sets will be installed, the inland and East Coast locations were chosen to give the maximum amount of protection to the greatest number of persons.

Eventually the hurricane-watching circuit will stretch along the Gulf and Atlantic Coasts from Brownsville, Texas, to Maine. Radars of a different type, although also with a 250-mile radius, are already installed at Cape Hatteras, N. C., Nantucket, Mass., and in San Juan, Puerto Rico.

Using radars, meteorologists are able to keep a continual check on storm progress and development. The new sets are convertible, operating at one of three different frequencies, 9,300, 5,600 and 2,800 megacycles, whichever is most suitable for the expected weather conditions.

Science News Letter, September 5, 1959

MEDICINE

Tranquilizers Shield Brain

Tranquilizers with their large umbrella-shaped chemical structures appear to be related to atropine in their action of shielding the brain from stresses.

TRANQUILIZERS may literally be umbrellas that protect the brain from a shower of stresses and strains.

Structurally, tranquilizers resemble atropine which is known to dry the mouth and stop intestinal movement, or curare, the Indian arrow poison that paralyzes muscles. All have large umbrella-like chemical structures which may shield the nerves from stimulating substances, Dr. T. C. Barnes, formerly of Hahnemann Medical College, Philadelphia, reported the American Pharmaceutical Association meeting in Cincinnati.

Dr. Barnes bases this explanation of tranquilizers upon the results of an experiment with neurotic mice. He found that one tranquilizing chemical, stelazine, was three times as powerful as thorazine in subduing the neurotic behavior of the mice. Stelazine has an added piperazine ring to the three-ring umbrella structure of thorazine, Dr. Barnes pointed out.

A good umbrella must have a handle, Dr. Barnes continued. In the phenothiazine tranquilizers, this essential part of the structure is a row of three carbon atoms. The nerve is accustomed to this handle because it is present on several natural neurohumoral agents such a adrenalin and histamine.

The newest umbrella tranquilizer is mellaril or thoridazine which has a four-ring structure like stelazine, but which lacks the essential "handle," the three-carbon chain. This may explain why it is so weak, the researcher speculated.

A mental patient may require a gram of mellaril where five milligrams of stelazine would do the job.

In major epilepsy, the umbrella theory works very well, Dr. Barnes pointed out. All drugs used in severe fits have a phenyl or flat benzene ring structure which may have a protecting or screening effect. For example, phenobarbital is the only sleeping pill or barbiturate used in severe epilepsy, and the only phenyl "umbrella" in this large group of drugs, he explained.

Science News Letter, September 5, 1959

***DRUG OBSERVER**—A device consisting of an induction heating coil is able to open capsules and release drugs at predetermined areas of an animal's gastro-intestinal tract without surgery or any direct electrical or mechanical attachments. The absorption of oral drugs can be studied. The device, developed by the Smith Kline & French Laboratories, will eventually be used in similar studies in humans.*

SURGERY

Stimulate Heart Beat Through Jugular Vein

A NEW METHOD of stimulating the heart through the jugular vein is described in *The Lancet* (August 1).

This should be particularly valuable in anesthesia emergencies, during acute heart-block or when circumstances are not favorable for methods such as heart massage that involve opening the chest cavity says Dr. F. F. Weale of Guy's Hospital, London, England.

Five dogs with experimentally induced heart block were studied. An insulated wire electrode was passed down the dog's right jugular vein into the right ventricle. An artificial cardiac "pacemaker" was then connected to the electrode and to a skin electrode. In each case, Dr. Weale reports, there was "satisfactory ventricular response" at voltages roughly a quarter of those needed for another method of stimulation.

Special tests with two of the dogs showed that some blood clots had formed, "plugging" the external jugular vein. However, clots surrounding the electrode lead did not materially obstruct the return blood flow of the superior vena cava, one of the body's main veins. There was also no evidence of burned heart tissue, the British researcher says. In purely medical cases, he explains, anticoagulants may be useful.

The method avoids the "considerable discomfort" found with "external" electrodes, Dr. Weale says.

Science News Letter, September 5, 1959

CONSERVATION

Our Last Wilderness

Priceless wildlife is disappearing now as our 49th state seems to be making the same mistakes in caring for its land and creatures as were made in continental United States.

By BENITA TALL

CITIZENS of the state of Alaska, joining the United States in 1959, could be living in the world of 1859.

Like the rest of the U.S. 100 years ago, Alaska is a pioneer land rich with natural resources. Many of its citizens have the same drive and spirit that inspired the settlers of the western U.S. It is developing its resources at an increasingly fast rate. People are going to Alaska to see what it is like to live in a pioneer land and, perhaps, to stay.

But along with the pioneers, comes destruction.

In the wake of this migration and building comes the same potential for misuse of land and death to wild animals and plants that followed the westward movement across the continental United States. The same mistakes that brought dust bowls and added to the roster of extinct wildlife can be repeated.

Ten years from today, five years or even next year may be too late to begin to take the needed steps to protect what has been described as virtually the only "authentic living wilderness left for humans."

Wilderness: Practical and Esthetic

As a growing, up-and-coming state, Alaska needs water for power, land for its citizens, minerals, lumber, fish for its fisheries industry. Right now, many of the area's mineral resources are depleted and its salmon fisheries overfished. Fires destroy tens of thousands of acres of forests. Conservation and careful management of existing resources can provide for the new state's current and future needs, however. A problem arises when Alaskans come in conflict with their wilderness.

Wilderness, primitive, untouched land and its plant and animal life, cannot be managed. It can only be protected against man's misuse. The history of the United States is filled with descriptions of what the land was once like, of how flocks of migrating birds darkened the sky. Alaska still contains some of this "once-upon-a-time land."

There is now a bill, H.R. 7045, up before the Congress that would preserve a part of the wilderness as an Arctic Wildlife Range. There is also opposition to the bill. Alaskans apparently welcome legislation to protect Indiana's sand dunes, for example, but resent legislation designed to protect part of their own "unique and irreplaceable" land.

Fisheries, wildlife, tourists and related industries will make up most of Alaska's estimated 1962 income. Fisheries and wildlife alone are expected to contribute $150,000,000.

Without protection, these fisheries and wildlife cannot long continue to contribute to the new state's income. Tourists will soon stop coming when Alaska's "wilderness" is invaded by towns, industry, airplane landing strips and highways.

In a very practical sense, Alaska's future depends upon her keeping a part of the land as it was before man came.

H.R. 7045 is a bill which, if passed, would authorize the establishment of an Arctic Wildlife Range close to 9,000,000 acres in area—larger than the state of Maryland. (This is still only 2.4% of Alaska's land.) The boundaries have been set with the purpose of keeping intact an "ecological whole."

The 9,000,000-acre tract, commonly called the Brooks Range, has been only partially surveyed. It is a unit so far as wildlife is concerned. Here animals can move at will, unrestricted by man-made boundaries. Prey and predator live together as they have for centuries. The land, if left completely alone, can support its animal population, if man does not tamper with it by additions or over-protection.

The actual mountain range itself, a northwest extension of the Rocky Mountains, was named after Alfred H. Brooks, chief Alaskan geologist for the U.S. Geological Survey from 1903 to his death in 1924.

Caribou and reindeer are dependent on reindeer moss, a lichen, for their food during the critical Arctic winters. Both these animals are severly reduced in numbers: the caribou now total about 20,000, a loss of more than a million in the past 20 years largely as a result of fire destroying their range. Several years are needed for a range to recover from just one passage of a feeding herd across it.

This Brooks Range area is also the only place in the United States where polar bear den up for the production of young. Dall sheep, grizzly bears, wolverines, ptarmigan, black-tailed deer are found here. Mount Michaelson, 8,000 feet high with its unusual Arctic glaciers, is included in the wildlife range.

Alaskans oppose the bill that would preserve this range with one main argument: Its passage would mean the loss of some $600,000 in Federal road funds.

Answers for Opponents

Those who recommend passage point out that, under the public law, millions of acres in Alaska have already been withdrawn by the Federal Government. Establishing the Arctic Wildlife Range would mean an anticipated loss of only $275,000 in these road funds. Furthermore, efforts are being made to restore to the Public Domain approximately 20,000,000 acres held by the Navy, while making adequate provision for future conservation.

If steps are taken now to keep the Brooks Range area in its wilderness state, there will be no need to disturb any community since no one lives there except a few natives, who would remain. They would be free to live on the Range and hunt and fish as they have in past years. As the conservationists point out, protecting the land now would involve no disrupting of communities. In a few years it is probably that people will be moving into the area, setting up camps and generally establishing permanent homes

WILDERNESS WOLVES—An important role in the wilderness world of the Alaskan range is played by these wolves, photographed here by naturalist Herb Crisley. In some areas man's overhunting of predators, such as the wolves, has resulted in huge populations of deer which cannot find enough food. Thus man's interference leads to an upset in the natural balance of life.

and businesses. In the past such communities have presented a serious problem when land was to be set aside as national parks, wildernesses or similar places.

National defense would still be maintained, since land can be set aside for this purpose by executive order.

Since these 9,000,000 acres are a range, not a refuge, they are not closed to mining, oil and gas leasing. As Theodore Stevens, assistant secretary of the Department of the Interior, said: "We do want to permit the proper exploitation of any mineral deposit found there and necessary for the development of Alaska." This can be done by using particular mining techniques that do not unnecessarily disturb the land surface.

Passage of H.R. 7045 is uncertain. What is certain is that without such a law, Alaska and the rest of the United States will suffer an irrevocable loss.

Science News Letter, September 5, 1959

PHOTOGRAPHY

Prize Photo Shows Bee Collecting Pollen

See Front Cover

MEDICAL and scientific photography were the subject of a meeting in Montreal, Canada, of the Biological Photographic Association.

A new method for studying unstained, living bacteria, cells and other specimens by color phase "optical staining" was reported. A new technique for photographing vocal cords in action was also described.

Various prizes were given for the best photographs in several categories. The photograph on the cover of this week's SCIENCE NEWS LETTER was an award-winner in the natural science, monochrome prints category. Taken by William P. Nye of the U. S. Bee Culture Laboratory, U. S. Department of Agriculture, Logan, Utah, it shows a bumble bee collecting pollen from the Caragana or peatree.

Science News Letter, September 5, 1959

Questions

ARCHAEOLOGY—What is the new technique for dating prehistoric rocks and pottery based upon? p. 148.

PLANT PHYSIOLOGY—How does a Russian scientist claim to have made plants drought-resistant? p. 147.

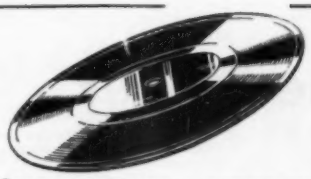
TECHNOLOGY—How have synthetic sapphires been made? p. 152.

Photographs: Cover, Biological Photographic Association, Inc.; p. 147, Climax Molybdenum Company; p. 149, Pitney-Bowes, Inc.; p. 153, Smith Kline & French Laboratories; p. 154, Herb Crisley—*The Living Wilderness*; p. 160, Furlong M.A.P. Co.

Do You Know

The melting of *ice* along the Antarctic coast in the summer causes a rapid decrease in the saltiness of the neighboring sea.

The incidence of *Rocky Mountain spotted fever* shows a marked decrease in the mountain and Pacific States where once more than 99% of cases occurred.



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• Books of the Week •

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THE ACUTE RADIATION SYNDROME: A Medical Report on the Y-12 Accident, June 16, 1958—Marshall Brucer, Compiler—*Oak Ridge Inst. of Nuclear Studies (Off. of Tech. Serv.)*, 190 p., illus., paper, $2.50. Report on the acute phase of hospital care of five patients during the six weeks after the accident.

THE ADVENTURE BOOK OF GROWING PLANTS—Frances M. Miner, Alfred D. Beck, Ed.—*Capitol Pub. (Golden Press)*, 96 p., illus. by Aubrey Combs, Jr., $3.95. Tells boys and girls about plant growth, and how to take care of plants.

THE ADVENTURE BOOK OF WEATHER—Harry Milgrom, Alfred D. Beck, Ed.—*Capitol Pub. (Golden Press)*, 96 p., illus. by Mildred Waltrip, $3.95. Introduces boys and girls to the science of meteorology, contains experiments and bibliography, and tells how to prepare for a career.

ADVENTURE IS UNDERGROUND: The Story of the Great Caves of the West and the Men Who Explore Them—William R. Halliday—*Harper*, 206 p., 63 photographs, $4.50. Compilation of the discovery and exploration of the great caves of the western U. S. Includes glossary.

ALBERT EINSTEIN: Philosopher-Scientist, Vols. I and II—Paul Arthur Schilpp, Ed.—*Harper*, 781 p., illus., paper, each vol. $1.95. Reprint of collection of discussions of Einstein's ideas by leading scientists and philosophers. Vol. I includes Einstein's autobiography; Vol. II, his reply to critics and bibliography of his writings.

THE ANNUAL SURVEY OF PSYCHOANALYSIS: A comprehensive survey of current psychoanalytic theory and practice, Vol. V—John Frosch and Nathaniel Ross, Eds.—*Int. Univs. Press*, 608 p., $12. Reference volume, with bibliography.

CANADIAN CANCER CONFERENCE, Vol. 3: Proceedings of the Third Canadian Cancer Research Conference—R. W. Begg, Ed.—*Academic*, 461 p., illus., $12. The four topics under discussion were nucleic acids, genetics, viruses and tumors, and the biology of cancer.

THE CYTOPATHOLOGY OF VIRUS INFECTION—Robert Love, Ed.—*N. Y. Acad. of Sciences, Annals*, Vol. 81, Art. 1, 213 p., illus., paper, $4.50. Monograph delineates many of the newer techniques such as electron microscopy, cytochemistry, and fluorescent labeling.

DICTIONARY OF ECONOMIC PLANTS—J. C. Th. Uphof—*Engelmann (Hafner Pub. Co., N. Y.)*, 400 p., $9.75. Lists scientific and common names of 6000 species, with their geographical distribution, products and economic uses.

A DICTIONARY OF SCIENCE: Definitions and Explanations of Terms Used in Chemistry, Physics, and Elementary Mathematics—E. B. Uvarov, rev. with D. R. Chapman—*Penguin*, 240 p., paper, 85¢. Reprint of revised 1951 edition.

ELECTROLYTE SOLUTIONS: The Measurement and Interpretation of Conductance, Chemical Potential and Diffusion in Solutions of Simple Electrolytes—R. A. Robinson and R. H. Stokes—*Academic*, 2nd ed., 559 p., illus., $11.50. Revision includes new experimental and theoretical developments, and recent work on conductance of non-aqueous solvents.

EXOTIC ZOOLOGY—Willy Ley—*Viking*, 468 p., illus. by Olga Ley, $4.95. From the unicorn and other fairy-tale fauna to the pigmy hippo and coelacanth. Rearranged, expanded and up-to-date version of three earlier books by the author.

FIRST COLLOQUIUM ON THE LAW OF OUTER SPACE: The Hague 1958 Proceedings—Andrew G. Haley and Welf Heinrich Prince of Hanover, Eds.—*Springer-Verlag, Vienna*, 126 p., paper, $4.50. Papers discussing legal aspects of radio communication frequencies, air space, moon, fourth dimension and other aspects of the new frontier.

GEMSTONES OF NORTH AMERICA—John Sinkankas—*Van Nostrand*, 704 p., color plates & drawings by author, $15. Thorough treatment of each gemstone species, tells where and under what circumstances it is found. Includes bibliography, glossary, geographical and locality index.

GENERAL METEOROLOGY—Horace Robert Byers—*McGraw*, 3rd ed., 540 p., illus., $9.50. Introductory text for serious students of meteorology, treating the atmosphere as a whole, from the upper levels downward, explaining how processes work and how they can be related to mathematical statements.

HUMAN NATURE AND THE HUMAN CONDITION—Joseph Wood Krutch—*Random House*, 211 p., $3.95. Author focuses on such contemporary problems as overpopulation, the cult of the "high standard of living", and the question of more leisure for whom and for what.

INDUSTRIAL GUMS: Polysaccharides and Their Derivatives—Roy L. Whistler and James N. BeMiller, Eds.—*Academic*, 766 p., illus., $25; until Sept. 30, 1959, $21. Practical and integrated reference work of carbohydrate gums, their processing methods and applications.

AN INTRODUCTION TO JUNG'S PSYCHOLOGY—Frieda Fordham—*Penguin*, 128 p., paper, 95¢. Exposition for the general reader of the theories and techniques of the psychologist who originated such terms as "complex", "introvert", and "extravert".

J. M. CHARCOT, 1825-1893: His Life, His Work—Georges Guillain, ed. & transl. from French by Pearce Bailey—*Hoeber-Harper*, 202 p., illus., $7. Biography of the "father of modern neurology" and the medical institution where he taught, the Salpetiere in Paris.

KITES—Larry Kettelkamp—*Morrow*, 48 p., illus. by author, $2.75. Shows children how to build kites from simple to intricate.

MASERS—J. R. Singer—*Wiley*, 147 p., illus., $6.50. Introductory study of microwave amplifiers or oscillators operating on the principle of induced emission.

ON MATHEMATICS AND MATHEMATICIANS (Formerly titled: Memorabilia Mathematica or the Philomath's Quotation-Book)—Robert Edouard Moritz—*Dover*, new ed., 410 p., paper, $1.95. Reprint of 1913 reference book of of famous passages by mathematicians and writers.

OUR SPACE AGE JETS: A Completely Revised Edition of Our Fighting Jets—C. B. Colby—*Coward-McCann*, 48 p., illus., $2. Photographs, brief description and vital statistics of each airplane, with three-view drawings for scale models.

PRINCIPLES OF PHYSICAL CHEMISTRY—William H. Hamill and Russell R. Williams, Jr.—*Prentice-Hall*, 607 p., illus., $8.75. Two-semester introductory course, covering chemical thermodynamics, chemical equilibrium, electrochemistry, photochemistry and radiation chemistry.

RADIATION HYGIENE HANDBOOK—Hanson Blatz, Ed.—*McGraw*, 953 p., illus., $27.50. A practical reference covering the industrial, medical and research uses of radiation and atomic energy with special applications to the field of health physics, industrial hygiene and sanitary engineering.

ROAD OF PROPAGANDA: The Semantics of Biased Communication—Karin Dovring, introd. by Harold D. Lasswell—*Philosophical Lib.*, 158 p., $4.75. Probes methods of content analysis as an instrument for measuring "ideological" factors in social processes of past and contemporary history.

SOON AFTER SEPTEMBER: The Story of Living Things in Winter—Glenn O. Blough—*Whittlesey House*, 48 p., illus. by Jeanne Bendick, $2.50. Tells young children what they can observe about trees, bushes and animals getting ready for winter.

THE SOVIET AIR AND ROCKET FORCES—Asher Lee, Ed.—*Praeger*, 311 p., illus., $7.50. Experts examine Russian progress in air strategy, jet fighters and bombers, missiles, organization and training of personnel, and aircraft production.

(Continued on p. 158)

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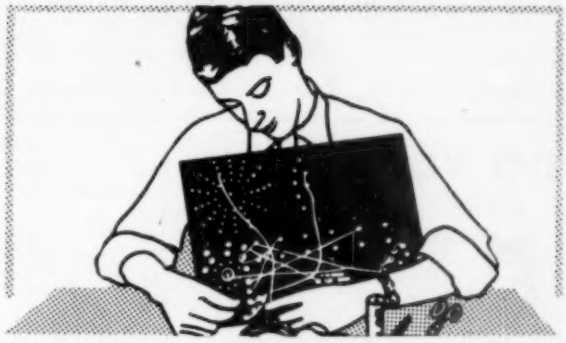

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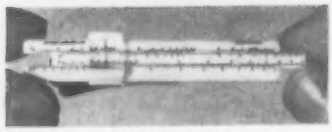

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Books of the Week

(Continued from p. 156)

THE SPANISH PLATEAU: The Challenge of a Dry Land — Peter Buckley — *Coward-McCann*, 96 p., photographs by author, maps, $2.50. Excellent short geography for young people and old.

STATUS REPORT ON FUEL CELLS—B. R. Stern —*Army Research Office* Report No. 1 *(Off. of Tech. Serv.)* 116 p., illus., paper, $1.25. First report reviewing available information, with introductory chapter on the fundamentals of the fuel cell.

THE STRUCTURE AND EVOLUTION OF THE UNIVERSE: An Introduction to Cosmology—G. J. Whitrow—*Harper*, 212 p., illus., paper, $1.45. Completely rewritten to include radio astronomy and other recent developments, it provides an up-to-date account of the latest observational data and theories in a form suitable for the layman.

STUDIES IN MATHEMATICAL LEARNING THEORY —Robert R. Bush and William K. Estes, Eds.— *Stanford Univ. Press*, 432 p., $11.50. Collection of research papers.

THE THOMAS ALVA EDISON FOUNDATION: Annual Report 1958—*Thomas Alva Edison Foundation*, 20 p., illus., paper, single copies free upon request direct to publisher, 8 W. 40th St., New York 18, N. Y. Foundation was organized to keep alive for the benefit of future generations the inspiration of the genius of Edison.

TRANSISTORS in Radio, Television and Electronics—Milton S. Kiver—*McGraw*, 2nd ed., 424 p., illus., $7.95. Stresses the practical aspects of transistors and their operation.

THE TECHNOLOGY OF FOOD PRESERVATION— Norman W. Desrosier—*Avi*, 418 p., illus., $8.50. Up-to-date discussion of food preservation by refrigeration, drying and canning methods. Chapters on fermentation, chemical additives and ionizing radiations. Bibliographies.

UTILIZATION OF NITROGEN AND ITS COMPOUNDS BY PLANTS: Symposia of the Society for Experimental Biology No. XIII—D. J. D. Nicholas and others—*Academic* for the Company of Biologists, 385 p., illus., $9.50. Papers read at the Symposium held at the University of Reading in September 1958.

WATER ALL AROUND—Tillie S. Pine and Joseph Levine—*Whittlesey House*, 48 p., illus. by Bernice Myers, $2.50. A first reader about experiments with water.

WHAT DOES IT DO AND HOW DOES IT WORK: Power Shovel, Dump Truck, and Other Heavy Machines—Russell Hoban—*Harper*, 63 p., illus. by author, $3.50. Picture book for boys.

WONDERS OF THE ARCTIC—Jacquelyn Berrill —*Dodd*, 94 p., illus. by author, $2.95. Tells young people about the living creatures of the Arctic region, exquisitely illustrated.

THE WOODS HOLE OCEANOGRAPHIC INSTITUTION: Report for the Year 1958—*Woods Hole Oceanographic Inst.*, 61 p., paper, single copies free upon request direct to publisher, Woods Hole, Mass. Reports on IGY participation, marine meteorology, geochemistry, instrumentation and research fleet.

Science News Letter, September 5, 1959

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Edwin Felch, project director in charge of developing the Titan guidance system, holds the "voice" of the ICBM.

VOICE OF A GUIDED MISSILE

This is a missile-borne transmitter. It is the "voice" of a missile in flight . . . part of a new radio-inertial guidance system developed by Bell Telephone Laboratories for the Ballistic Missile Division of the Air Force.

This versatile system helped deliver the nose cone of a Thor-Able test missile precisely to its South Atlantic target area—5000 miles from Cape Canaveral, Florida. So accurately was the nose cone placed that a waiting group of ships and planes retrieved it in a matter of hours. It was the first nose cone ever to be recovered after so long a flight.

The command guidance system which made such accuracy possible combines precision tracking radar with a special Remington Rand Univac computer. Fed a steady stream of signals from the missile-borne transmitter, the ground-based equipment compares the missile's flight path with the preselected path. Corrective steering orders are computed and transmitted automatically to the missile. The ground station monitors the progress of the flight continuously and obtains immediate evaluation of mission success. And since the principal control equipment is kept on the ground, expendable hardware in the missile itself is minimized.

This radio-inertial guidance system is a product of the Bell Laboratories-Western Electric development-production team. It is in production at Western Electric for the first operational squadrons of the Titan intercontinental ballistic missile.

Bell Labs scientists and engineers developed the world's most versatile telephone network and much of our nation's radar. They have constantly pioneered in missile systems. From their storehouse of knowledge and experience comes this new achievement in missile guidance.

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TIRE REFILLER CAN holds compressed air for inflating a flat automobile tire quickly so that the car may be driven to a service station. The refillable can is small enough to fit in the glove compartment. It is designed to avoid the hazard of changing a tire on a crowded highway and to prevent damage to tire, tube, rim, and wheel from driving on a flat.

Science News Letter, September 5, 1959

BAILER FOR ROWBOATS or dinghies is a six-inch-wide polyethylene plastic scoop with a handle on the back. The bottom of the bailer has a slight outward curve facilitating bailing in narrow spaces. The lightweight scoop will float. The bailer also makes a good dustpan aboard any boat.

Science News Letter, September 5, 1959

CARPENTER'S LEVEL is calibrated to show the angle and the inch rise per foot of the surface being measured. The two-inch-square precision level is enclosed in a shockproof plastic casing that is said to float in oil.

Science News Letter, September 5, 1959

MIDGET RACING CAR, shown in the photograph, for children has a two horsepower engine and an impact-resistant body of epoxy and glass fiber. The racer, available either as a complete car or in kit form, has individual wheel torsion suspension, an adjustable steering column, friction shock absorbers, and a tubular aircraft type frame.

Science News Letter, September 5, 1959

MEMORANDA HOLDER is a coil spring device designed to replace the dangerous spindle. By bending the spring, which can be clamped onto the edge of a shelf, desk or vehicle dashboard, messages, cards, tickets or bills can be inserted or removed. One slip can be removed without moving the others.

Science News Letter, September 5, 1959

POCKET CALENDAR works for every year from one to 2400 A.D., with the change, in 1582, from the Julian to Gregorian calendar accounted for. The booklet has an index for the 20th century and one for all 2,400 years so that the calendar for a particular year can be quickly located.

Science News Letter, September 5, 1959

IMPORTED CUCKOO CLOCK is only eight inches in height. It cuckoos every quarter hour and is said to keep accurate time. Imported from Germany, the clock has a weight and pendulum and is hand carved with a walnut finish.

Science News Letter, September 5, 1959

CLIP-ON ASH TRAYS made of anodized aluminum fasten to any tubular furniture, such as the arms and legs of chairs or tables. The ash trays, available in four colors, have a snap-on outdoor top. They will not stain or discolor and can be cleaned with a damp cloth.

Science News Letter, September 5, 1959

Nature Ramblings

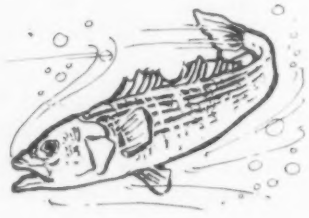
By HORACE LOFTIN

Introducing Animals

SOMETIME NEAR the end of the last century, English sparrows and starlings were introduced to this country from Europe. As immigrants, they certainly thrived in the New World and at the expense of native birds and the patience of long-suffering humanity.

Then there were also the rabbits which an English emigree imported to his new home in Australia for some Old World sport. In short order the rabbits increased tremendously on that island continent, becoming an agricultural scourge. It actually became necessary to introduce a virulent rabbit disease from Europe in order to bring them somewhat under control.

Such cases as these are rather exceptional in that the immigrants managed even to survive and hold their own, not to mention increase phenomenally. In most instances, attempts at introducing new species fail completely. The new animals usually are unable to meet the competition offered by the old established ones. It is also something of a rule that when imported animals do manager to take hold, they usually cause more damage to the environment than good.



There are some striking exceptions to both these "rules," however. The striped bass, beloved of sports fishermen, is an example.

In 1879 and 1881, yearling striped bass were taken from New Jersey waters and carried by rail to California, where 435 were transplanted in San Francisco Bay. Within ten years, striped bass were present there in commercial quantities, and by 1899 fishermen took 1,234,000 pounds in California waters. They have since spread south of San Francisco and as far north as Oregon.

This successful transplantation has created a new and valuable commercial fishery on the West Coast. It has been a boon to sports fishermen and economically profitable to the people who cater to sports fishermen. So far as is known, the increase of the striped bass on the West Coast has had no important detrimental effects on native fishes. All in all, the case of the striped bass is a very happy exception to the usual unhappy results of transplantation of animals.

How and why the striped bass managed to increase and thrive is explained by their reproductive potential. They spawn in fresh water in spring. A small three-pounder may produce 14,000 eggs; a really big one, like the 50-pounders the sportsmen go after, may lay 5,000,000 eggs in one season. Even though many of these will never hatch, this is still a large number.

Science News Letter, September 5, 1959